

Brian E. J. Rose

Assistant Professor

Department of Atmospheric and Environmental Sciences

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Canadian citizen, lawful permanent resident of the USA, fluent in English and French

EDUCATION

- 2010 PhD, Climate Physics and Chemistry, Massachusetts Institute of Technology
Oceanic control of the sea ice edge and multiple equilibria in the climate system (Advisor: J. Marshall. Awarded 2010 Rossby Prize.)
- 2002 MSc, Atmospheric and Oceanic Sciences, McGill University
A diagnostic scheme for global precipitation based on vertical motion (Advisor: C.A. Lin)
- 1999 BSc, Atmospheric and Oceanic Sciences, McGill University
Numerical simulation of a mesoscale vortex over the Beaufort Sea (Advisor: M.K. Yau)

APPOINTMENTS

- 2013 – Assistant Professor (tenure-track), Atmospheric and Environmental Sciences, University at Albany (SUNY)
- 2012 – 2013 Research Associate, Atmospheric Sciences, University of Washington
- 2010 – 2012 NOAA Climate and Global Change Postdoctoral Fellow, Atmospheric Sciences, University of Washington. Host: David S. Battisti
- 2010 Postdoctoral Associate, Earth, Atmospheric and Planetary Sciences, MIT
- 2005 – 2010 Research Assistant, Earth, Atmospheric and Planetary Sciences, MIT
- 2003 – 2004 Research Assistant, Atmospheric and Oceanic Sciences, McGill University
- 2000 Research Assistant, McGill University and *Centre de recherche en calcul appliqué*, Montreal

PUBLICATIONS

** indicates student co-author*

- 2017 Hoffman, P.F., D.S. Abbot, Y. Ashkenazy, D.I. Benn, J.J. Brocks, P.A. Cohen, G.M. Cox, J.R. Creveling, Y. Donnadieu, D.H. Erwin, I.J. Fairchild, D. Ferreira, J.C. Goodman, G.P. Halverson, M.F. Jansen, G. Le Hir, G.D. Love, F.A. Macdonald, A.C. Maloof, C.A. Partin, G. Ramstein, B.E.J. Rose, C.V. Rose, P.M. Sadler, E. Tziperman, A. Voigt, and S.G. Warren (2017), Snowball Earth climate dynamics and Cryogenian geology–geobiology. *Science Advances* 3:e1600983, doi:10.1126/sciadv.1600983

- 2017 Singh, H.A., P.J. Rasch and B.E.J. Rose (2017), Increased Ocean Heat Convergence into the High Latitudes with CO₂-Doubling Enhances Polar-Amplified Warming. *Geophys. Res. Lett.* 44, doi:10.1002/2017GL074561
- 2017 Rose, B.E.J., T.W. Cronin and C.M. Bitz (2017), Ice Caps and Ice Belts: the effects of obliquity on ice-albedo feedback. *Astrophys. J.* 846, doi:10.3847/1538-4357/aa8306
- 2017 Haugstad, A.D.*, K.C. Armour, D.S. Battisti and B.E.J. Rose (2017), Relative roles of surface temperature and climate forcing patterns in the inconstancy of radiative feedbacks. *Geophys. Res. Lett.* 44, doi:10.1002/2017GL074372
- 2016 Voigt, A., M. Biasutti, J. Scheff, J. Bader, S. Bordoni, F. Codron, R.D. Dixon, J. Jonas, S.M. Kang, N.P. Klingaman, R. Leung, J. Lu, B. Mapes, E.A. Maroon, S. McDermid, J. Park, R. Roehrig, B.E.J. Rose, G.L. Russell, J. Seo, T. Toniazzo, H. Wei, M. Yoshimori, and L.R.V. Zepetello (2016), The Tropical Rain belts with an Annual Cycle and Continent Model Intercomparison Project: TRACMIP. *J. Adv. Model. Earth Syst.* 8, 1868–1891, doi:10.1002/2016MS000748
- 2016 Rose, B.E.J. and L. Rayborn* (2016), The effects of ocean heat uptake on transient climate sensitivity. *Current Climate Change Reports* 2, 190–201, doi:10.1007/s40641-016-0048-4.
- 2016 Rose, B.E.J. and M.C. Rencurrel* (2016), The vertical structure of tropospheric water vapor: comparing radiative and ocean-driven climate changes. *J. Climate* 29, 4251–4268.
- 2015 Rose, B.E.J. (2015), Stable “Waterbelt” climates controlled by tropical ocean heat transport: a non-linear coupled climate mechanism of relevance to Snowball Earth. *J. Geophys. Res.* 150, doi:10.1002/2014JD022659
- 2014 Rose, B.E.J., K. Armour, D.S. Battisti, N. Feldl and D. Koll (2014), The dependence of transient climate sensitivity and radiative feedbacks on the spatial pattern of ocean heat uptake. *Geophys. Res. Lett.* 41, doi:10.1002/2013GL058955.
- 2013 Rose, B.E.J., D. Ferreira and J. Marshall (2013), The role of oceans and sea ice in abrupt transitions between multiple climate states. *J. Climate* 26, 2862–2879.
- 2013 Rose, B.E.J. and D. Ferreira (2013), Ocean heat transport and water vapor greenhouse in a warm equable climate: a new look at the low gradient paradox. *J. Climate* 26, 2117–2136.
- 2011 Ferreira, D., J. Marshall and B.E.J. Rose (2011): Climate determinism revisited: multiple equilibria in a complex climate model. *J. Climate.* 24, 992–1012.
- 2010 Rose, B.E.J. (2010): Oceanic control of the sea ice edge and multiple equilibria in the climate system, PhD thesis, MIT, Cambridge MA.
- 2009 Rose, B.E.J. and J. Marshall (2009): Ocean heat transport, sea ice, and multiple climate states: insights from energy balance models. *J. Atmos. Sci.* 66, 2828–2843.
- 2003 Rose, B.E.J. and C.A. Lin (2003): Precipitation from vertical motion: a statistical diagnostic scheme. *Int. J. Climatol.* 23, 903–919.

Reprints available at <http://www.atmos.albany.edu/facstaff/brose/>

WORK IN PROGRESS

- 2018 Rencurrel, M.C.* and B.E.J. Rose (2018), Exploring the climatic response to wide variations in ocean heat transport on an aquaplanet (in revision for *J. Clim.*)
- 2018

- 2018 A. Dai, D. Huang, B.E.J. Rose, J. Zhu and X. Tian, New Estimates of the Equilibrium Climate Sensitivity in Coupled Climate Models (submitted to Climate Dynamics)
- 2018 Cardinale, C.*, B.E.J. Rose and A.L. Lang, Stratospheric and Tropospheric Contributions to the Poleward Energy Flux Across 70°N and 65°S (to be submitted to J. Atmos. Sci.)
- 2018 Rencurrel, M.C.* and B.E.J. Rose, Understanding the Hadley circulation response to wide variations in ocean heat transport. (in prep.)
- 2018 Rose, B.E.J., Climate in the absence of ocean heat transport. (to be submitted to J. Adv. Model. Earth Syst.)
- 2018 Rose, B.E.J., L. Rayborn* and N. Feldl, Understanding the Dependence of Radiative Feedbacks and Clouds on the Spatial Structure of Ocean Heat Uptake. (in prep.)

OTHER SCHOLARLY ACTIVITY

DEVELOPER OF OPEN-SOURCE SCIENTIFIC COMPUTER SOFTWARE

All source code publicly available at <https://github.com/brian-rose/>

- 2014 – CLIMLAB, a Python-based toolkit for interactive, process-oriented climate modeling
- 2015 – pyCESM, a Python-based analysis package for output from the Community Earth System Model

GRANT FUNDING

- 2015 – 2020 CAREER: Understanding the role of oceans in the planetary energy budget (PI). NSF, \$544,681
- 2018 Does the Earth System have multiple stable states? UAlbany FRAP-B award, \$4,000 (under review)

PRESENTATIONS

INVITED PRESENTATIONS

- 2018/01 AMS 17th Annual Student Conference, Tools of the Trade session: The Jupyter notebook.
- 2017/09 Columbia University, SEAS Colloquium in Climate Science: Why does climate sensitivity go up as ocean heat uptake declines? A linear systems perspective.
- 2017/05 York University, Earth & Space Sci. & Eng.: Global climate sensitivity goes up as ocean heat uptake declines: a linear systems perspective on inconstant climate feedbacks.
- 2017/03 MIT, PAOC seminar: Why does climate sensitivity go up as ocean heat uptake declines? A linear systems perspective.
- 2016/04 UW, Atmos. Sci.: The vertical structure of tropospheric water vapor: comparing radiative and ocean-driven climate changes.
- 2016/04 UW, Atmos. Sci.: Climate in the absence of ocean heat transport.
- 2015/11 Columbia University, SEAS Colloquium in Climate Science: Understanding the effects of ocean circulation on radiative feedbacks and the planetary energy budget.

- 2015/09 Stony Brook University, Marine & Atmos. Sci.: Understanding the effects of ocean circulation on radiative feedbacks and the planetary energy budget.
- 2015/01 Massachusetts College of Liberal Arts: What sets the temperature of the Earth? (public lecture)
- 2013/10 Caltech ESE seminar: The role of oceans in climate sensitivity and radiative feedbacks
- 2013/10 Courant Institute, NYU: The role of oceans in climate sensitivity and radiative feedbacks.
- 2013/05 SIAM Dynamical Systems conference: Multiple sea ice states and hysteresis in climate models.
- 2013/03 McGill University, Atmos. & Oceanic Sci.: One wet planet, many climates.
- 2013/03 UW, Atmos. Sci.: Climate sensitivity and the oceans.
- 2013/01 U. Albany, Atmos. & Environ. Sci.: One wet planet, many climates.
- 2012/11 UW, Atmos. Sci.: Understanding why ocean heat transport matters: a multi-model approach.
- 2012/05 MIT EAPS: Why does the climate system care about ocean heat transport?
- 2012/04 UW, Oceanography: Modeling* the role of oceans and sea ice in multiple equilibria, abrupt climate change, and Snowball Earth (* and maybe understanding).
- 2012/04 U. Chicago, Geophysical Sci.: Water, water everywhere: role of oceans in warm climates.
- 2012/03 LDEO, Columbia U.: Why does the climate system care about ocean heat transport?
- 2011/10 U. Chicago, Geophysical Sci.: Why does the climate system care about ocean heat transport?
- 2011/10 UW, Oceanography: Why does the climate system care about ocean heat transport?
- 2011/09 ACDC2011, Friday Harbor WA: Ocean heat transport and weak temperature gradients.
- 2011/02 CalTech, Environ. Sci. & Eng.: Impact of ocean heat transport in cold and warm climates.
- 2011/01 UW, Atmos. Sci.: Oceanic control of the sea ice edge and multiple equilibria.
- 2010/09 Harvard U., Earth and Planetary Sci.: Multiple equilibria of sea ice and climate.

CONTRIBUTED CONFERENCE PRESENTATIONS

** indicates student co-author*

- 2018/01 Rose, B.E.J. and C. Cardinale*, Stratospheric and Tropospheric Contributions to the Flux of Moist Static Energy across 70°N (oral presentation), AMS 31st Conference on Climate Variability and Change.
- 2018/01 Rose, B.E.J., A Computational Approach to Climate Science Education with CLIMLAB, AMS Eighth Symposium on Advances in Modeling and Analysis Using Python.
- 2017/12 Rose, B.E.J., Climate in the absence of ocean heat transport (oral presentation), AGU Fall Meeting
- 2017/12 Rose, B.E.J., A computational approach to climate science education with CLIMLAB (poster), AGU Fall Meeting
- 2017/12 Rencurrel, M.C.* and B.E.J. Rose, Understanding the robustness of Hadley cell response to wide variations in ocean heat transport (oral presentation), AGU Fall Meeting
- 2017/12 Cardinale, C.* and B.E.J. Rose, Stratospheric and Tropospheric Contributions to the Flux of Moist Static Energy Across 70°N and 65°S (poster), AGU Fall Meeting

- 2017/06 Rose, B.E.J., T.W. Cronin and C.M. Bitz, Ice Caps and Ice Belts: the effects of obliquity on albedo feedback (oral presentation), AMS Conference on Atmospheric and Oceanic Fluid Dynamics.
- 2017/06 Singh, H.A., P.J. Rasch and B.E.J. Rose, Impact of Ocean Dynamics on Polar Climate Change (oral presentation), AMS Conference on Atmospheric and Oceanic Fluid Dynamics.
- 2017/01 Rose, B.E.J., CLIMLAB: a Python-Based Software Toolkit for Interactive, Process-Oriented Climate Modeling, AMS Seventh Symposium on Advances in Modeling and Analysis Using Python.
- 2016/12 Rose, B.E.J. and L. Rayborn*, Climate sensitivity increases as ocean heat uptake declines: a linear systems perspective (oral presentation), AGU Fall Meeting.
- 2016/12 Rose, B.E.J., Interactive, process-oriented climate modeling with CLIMLAB (oral presentation), AGU Fall Meeting.
- 2016/12 Rayborn, L.* and B.E.J. Rose, Understanding the Dependence of Radiative Feedbacks and Clouds on the Spatial Structure of Ocean Heat Uptake (oral presentation), AGU Fall Meeting.
- 2016/12 Rencurrel, M.C.* and B.E.J. Rose, Understanding Atmospheric Adjustment to Variations in Tropical Ocean Heat Transport (poster), AGU Fall Meeting.
- 2016/11 Rose, B.E.J., CLIMLAB: a Python toolkit for interactive, process-oriented climate modeling (oral presentation), AOSPY workshop, Columbia University.
- 2016/11 Rose, B.E.J., Robust non-local effects of ocean heat uptake on radiative feedback and subtropical cloud cover (oral presentation), Model Hierarchies workshop, Princeton.
- 2016/02 Rose, B.E.J., Robust non-local effects of ocean heat uptake on radiative feedback and subtropical cloud cover (oral presentation), Ocean Sciences.
- 2015/12 Rayborn, L.* and B.E.J. Rose, Robust effects of ocean heat uptake on radiative feedback and subtropical cloud cover: a study using radiative kernels (oral presentation), AGU Fall Meeting.
- 2015/12 Rencurrel, M.C.* and B.E.J. Rose, Atmospheric compensation of variations in tropical ocean heat transport: understanding mechanisms and implications on tectonic timescales (poster), AGU Fall Meeting.
- 2015/12 Rose, B.E.J., Climate in the absence of ocean heat transport (poster), AGU Fall Meeting.
- 2015/12 Rose, B.E.J., CLIMLAB: a Python-based software toolkit for interactive, process-oriented climate modeling (poster), AGU Fall Meeting.
- 2014/12 Rose, B.E.J., Accidental Lessons on Nonlinear Wind - Ocean - Sea Ice Interaction in the Tropics, with Implications for Snowball Earth (poster), AGU Fall Meeting.
- 2014/06 Rose, B.E.J., The dependence of transient climate sensitivity and radiative feedbacks on the spatial pattern of ocean heat uptake (oral presentation), Latsis Symposium, ETH Zurich.
- 2013/12 Rose, B.E.J., D. Battisti and K. Armour, The dependence of transient climate sensitivity and radiative feedbacks on the spatial pattern of ocean heat uptake (oral presentation), AGU Fall Meeting.
- 2012/12 Rose, B.E.J., Understanding the atmospheric response to ocean heat transport: a model inter-comparison (oral presentation), AGU Fall Meeting.
- 2011/12

- Rose, B.E.J., D. Ferreira and J. Marshall, Not all poleward heat transport is created equal: a new look at warm climates, water vapor feedback, and the low-temperature-gradient paradox (oral presentation), AGU Fall Meeting.
- 2011/06 Rose, B.E.J., D. Ferreira and J. Marshall, On the dynamics of an abrupt climate change (oral presentation), CMOS Congress, Victoria BC.
- 2011/05 Rose, B.E.J., D. Ferreira and J. Marshall, On the dynamics of an abrupt climate change (oral presentation), AMS Polar Meteorology and Oceanography Conference, Boston MA.
- 2010/07 Rose, B.E.J., Oceanic control of the sea ice edge and multiple equilibria in the climate system (thesis defense), MIT, Cambridge MA.
- 2010/06 Rose, B.E.J., D. Ferreira and J. Marshall, Multiple equilibria and abrupt climate change in coupled Aquaplanet simulations (oral presentation), CMOS Congress, Ottawa ON.
- 2010/05 Rose, B.E.J., Ocean heat transport, sea ice, and multiple equilibria of the climate system, Sack Lunch Seminar in Oceanography and Climate, MIT, Cambridge MA.
- 2009/11 Rose, B.E.J., D. Ferreira and J. Marshall, Multiple equilibria of the atmosphere-ocean-ice system (oral presentation), Ocean-Atmosphere Energy Transport conference, Pasadena CA.
- 2009/04 Rose, B.E.J., Multiple equilibria of the atmosphere-ocean-ice system (oral presentation), Graduate Climate Conference, UW, Pack Forest WA.
- 2008/04 Rose, B.E.J. and J. Marshall, Heat transport, wind stress and the ice edge: new insights from simple models (oral presentation), CMOS Congress, Kelowna BC.
- 2007/10 Rose, B.E.J., Sea ice, wind, and ocean currents: feedbacks and instabilities in ice age climates (oral presentation), Graduate Climate Conference, UW, Pack Forest WA.
- 2007/05 Rose, B.E.J. and J. Marshall, Constraints on atmospheric and oceanic heat transport from an idealized coupled climate model with sea-ice (oral presentation), CMOS-CGU-AMS Joint Congress, St. John's NF.
- 2006/04 Rose, B.E.J., The partition of heat transport in a simple coupled climate model (oral presentation), Graduate Climate Conference, UW, Pack Forest WA
- 2004/06 Rose, B.E.J. and C.A. Lin, A reconstruction of historical summer drought in Quebec based on tree rings (poster), Symposium Ouranos sur les changements climatiques, Montreal QC
- 2001/02 Rose, B.E.J. and C.A. Lin, Statistical relation between precipitation and vertical motion (oral presentation), Canadian CLIVAR Network Workshop, Victoria BC.

TEACHING AND ADVISING

COURSES AT U. ALBANY

- 2017, 2015 A ATM 623 Climate Modeling
- 2017, 2016, 2015 A ATM 500 Atmospheric Dynamics
- 2018, 2016, 2014 A ATM/ENV 415 Climate Laboratory (previously A ENV 480)
- 2014 A ATM 316 Dynamic Meteorology I
- 2013 A ATM 619 Oceans and Climate Seminar

PREVIOUS TEACHING

- 2013 UW ATMS 542 Geophysical Fluid Dynamics II, co-taught with David Battisti
- 2011, 2013 UW ATMS 514 / ESS 535 Ice and Climate, some guest lectures for C.M. Bitz
- 2011 Lecturer, Advanced Climate Dynamic Course ACDC2011, "Dynamics of Past Warm Climates"
- 2009 Lecture note preparation for P. O’Gorman, General Circulation of the Atmosphere, MIT
- 2007 Teaching assistant, guest lecturer for J. Marshall, Physics of Atmospheres and Oceans, MIT
- 2006 – 2007 Lab assistant for middle school science class, Fayerweather Street School, Cambridge MA
- 2006 Teaching assistant for R.S. Lindzen, Strange bedfellows: science and environmental policy, MIT

GRADUATE STUDENTS ADVISED

Current

- 2016 – Christopher Cardinale (advisor, MS anticipated spring 2018)
- 2014 – Michael Cameron Rencurrel (advisor, MS completed 2/2017, PhD qualifying exam 5/2017)
- 2015 – Anthony Coletti (committee member, U. Massachusetts Amherst, PhD defense anticipated spring 2018)
- 2014 – Hannah Attard (committee member, PhD prospectus 12/2015, PhD defense anticipated spring 2018)
- 2016 – Lanxi Min (committee member, PhD qualifying exam 5/2016)
- 2016 – Di Chen (committee member, PhD prospectus 12/2017)
- 2018 – Hing Ong (committee member, PhD qualifying exam anticipated spring 2018)

Completed

- 2015 – 2016 Lance Rayborn (advisor, MS completed 12/2016)
- 2013 – 2016 Christopher Colose (committee member, PhD defended 12/2016)
- 2014 – 2017 Theodore Letcher (committee member, PhD defended 2/2017)
- 2013 – 2017 Pablo Paiewonsky (committee member, PhD defended 6/2017)
- 2017 Christine Bloecker (MS thesis reader, 5/2017)
- 2015 Melissa Gervais (external PhD thesis examiner, McGill University)

UNDERGRADUATE STUDENTS ADVISED

- 2014 Deborah McGlynn (senior thesis in Environmental Science)
- 2013 – Academic advisor for roughly 12 students in Atmospheric Science and Environmental Science majors

SERVICE

DEPARTMENTAL

- 2017 Represented DAES at DEC Pack Forest camp College Exploration event
- 2015 – DAES graduate committee member
- 2014 – Chair, planning committee for GFD / Env. Sci. teaching laboratory in E-TEC building
- 2014 – Organizer, DAES Climate Group weekly seminar series
- 2017, 2015 Transfer student advising

COLLEGE OF ARTS AND SCIENCES

- 2016 – CAS Faculty Council (at-large councillor)
- 2016 – 2017 CAS Academic Planning Committee (inactive)
- 2017 – 2018 CAS Academic Support Committee

UNIVERSITY

- 2017 Strategic Planning Steering Committee (member of discussion group for Engaging Locally and Globally)
- 2018 – Udall Scholarship review committee

PROFESSIONAL

- 2017 – 2018 Member of Advisory Committee for NSF-funded workshop: “Enabling US Early Career Researchers to Advance Polar Science using High Performance Computing and Earth System Modeling”. To be held at NCAR (Boulder, CO) in August 2018.
- 2009 – Reviewer for Nature, J. Climate, J. Atmos. Sci., J. Geophys. Res., Geophys. Res. Lett., Nature Geosci., Nature Clim. Change, Nature Comm., JAMES, Astrophys. J., Mon. Not. R. Astron. Soc., SIAM J. Appl. Dyn. Sys., Earth Sys. Dyn., & Encyclopedia of Natural Resources
- 2015 – Proposal reviewer for National Science Foundation, United States-Israel Binational Science Foundation, and Israel Science Foundation
- 2015 Session Convener: “Polar Climate and Predictability”, AGU Fall Meeting.
- 2014 Session Convener: “Innovative Insights into the Climate System and Climate Models: Exploring Scales and Parameter Spaces”, AGU Fall Meeting.
- 2013 Judge for Outstanding Student Presentation Awards, AGU Fall Meeting.
- 2012 Commendation for exceptional refereeing, Nature Publishing Group.
- 2012/07 Convener and moderator, Workshop on heat transport in aquaplanet models, UW Atmos. Sci..
- 2011/04 Moderator, climate dynamics session, 20th anniversary celebration of the NOAA C&GC Postdoctoral Fellowship Program, Silver Spring MD, 04/2011.
- 2009/04 Chair (invited), ocean circulation session, 3rd Graduate Climate Conference, UW.

COMMUNITY

- 2018 – UAlbany Family Earth Day, organizer
- 2017, 2016 UAlbany Family Earth Day, rotating table demonstrations
- 2014/18 Space Science and Next Generation of Science Standards (forum for high school science teachers), lecture on climate change and climate modeling, RPI.
- 2007 – 2009 Session leader, YouthCAN Summit on Global Warming, MIT.
- 2008/01 Public seminar: “Looking Back on the Future of Climate Change”, MIT.

HONORS AND AWARDS

- 2010 – 2012 NOAA Climate and Global Change Postdoctoral Fellowship
- 2010 Carl-Gustav Rossby Prize for best thesis, MIT
- 2004 Jule G. Charney Prize and MIT Presidential Fellowship
- 2002 Dean’s Honour List for M.Sc. thesis, McGill University
- 2001 – 2002 NSERC Graduate Fellowship, McGill University
- 2001 Meteorological Service of Canada supplement to NSERC Fellowship (declined)
- 1999 NSERC Undergraduate Research Fellowship
- 1995 – 1999 James McGill Scholarship and J.S. Marshall Prize, McGill University

SUMMER SCHOOLS AND WORKSHOPS

- 2018/07 WCRP Grand Challenge on Clouds, Circulation and Climate Sensitivity: 2nd Meeting on Monsoons and Tropical Rain Belts, Trieste, Italy.
- 2018/06 ICTP Summer School on Theory, Mechanisms and Hierarchical Modelling of Climate Dynamics: Multiple Equilibria in the Climate System, Trieste, Italy.
- 2016/11 AOSPY / Pangeo scientific software workshop, Columbia University.
- 2016/11 Model Hierarchies Workshop, Princeton University.
- 2015/09 Monsoons and the ITCZ: the annual cycle in the Holocene and the future, Columbia University.
- 2012/09 PCC Summer Institute: Atmosphere-Ocean-Ice Shelf Interactions, Friday Harbor, WA.
- 2012/07 Workshop on heat transport in aquaplanet models, University of Washington.
- 2012/07 NOAA Climate and Global Change Summer Institute, Steamboat Springs, CO.
- 2011/09 ACDC2011: Dynamics of Past Warm Climates, Friday Harbor, WA.
- 2009/05 Fundamental Problems in Climate Dynamics, Princeton University.
- 2007/07 International Sea Ice Summer School, Svalbard.

PROFESSIONAL AFFILIATIONS

American Geophysical Union
 American Meteorological Society